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YOUNG BASILE 3001 WEST BIG BEAVER ROAD SUITE 624 TROY, MI 48084			EXAMINER ENIN-OKUT, EDU E	
			ART UNIT 1795	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/574,038	Applicant(s) HOSAKA ET AL.	
	Examiner Edu E. Enin-Okut	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,6-13,18-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,6-13,18-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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BIPOLAR ELECTRODE BATTERIES
AND METHODS OF MANUFACTURING BIPOLAR ELECTRODE BATTERIES

Detailed Action

1. The amendments filed on November 22, 2009 were received. Applicant has amended claims 1, 10, 12, 13, and 16; cancelled claim 5, 14, 15, 17 and 21; and, added claims 22-25. Currently, claims 1, 3, 6-13, 16, 18, 19, 20 and 22-25 are pending.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. The rejection of claims 12-20 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement, is withdrawn because claim 12 was amended.

Claim Rejections - 35 USC § 102

4. The rejection of claims 1, 3, 5, 6, 8, 10 and 11 under 35 U.S.C. 102(b) as being anticipated by Munshi (US 6,664,006) is withdrawn because claims 1, 6, and 10 were amended, and claim 5 was cancelled.

5. Claims 24 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Munshi (US 6,664,006).

Regarding claims 24 and 25, Munshi teaches stackable solid-state electrochemical cells, such as ultra-thin bipolar batteries with bipolar electrode structures having a polymer substrate serving as the film bipolar element (bipolar electrode stack) (9:36-40, 26:4-7, 29:1-7, 29:20-22). The bipolar structure is

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made by laminating anode and cathode active elements to opposing sides of a polymer substrate (collector) (26:7-18). The polymer substrate can include polyester (PET) impregnated with an electronically conducting polymer, such as polyacetylene, polypyrrole, polyaniline, etc. (21:66-22:8, 22:18-27, 22:28-43, 22:49-50, 26:11-14).

6. Claim 24 is rejected under 35 U.S.C. 102(b) as being unpatentable over Fukuzawa et al. (JP 2004-179053 A; refer to JPO Abstract and machine translation).

Regarding claim 24, Fukuzawa teaches a bipolar battery laminating bipolar electrodes (bipolar electrode stack) in which a positive active material layer 3 (cathode) is formed on one side of a current collector 2 and a negative active material layer 4 (anode) on the other side on both sides of a gel electrolyte layer 5 (Abstract; Drawing 1). The current collector is composed of a metal powder and resin binder (machine translation, para. 36). The resin binder may be, for example, an epoxy or a conductive polymer (para. 37).

Claim Rejections - 35 USC § 103

7. The rejection of claims 1, 3, and 5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al. (JP 2004-179053 A) in view of Hinton et al., Munshi, Hwang et al., and Usui et al. are withdrawn because claims 1 and 10 were amended, and claim 5 was cancelled.

8. Claims 1, 3, 8, 10, 11, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Munshi in view of Hisamitsu et al. (US 2004/0126655; cited in IDS).

Regarding claims 1, 3 and 22, Munshi teaches stackable solid-state electrochemical cells, such as ultra-thin bipolar batteries with bipolar electrode structures having a polymer substrate serving as the film bipolar element (bipolar electrode stack), as discussed above with respect to claims 24 and 25 above. The

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reference also teaches that the polymer substrate (collector) is impregnated with conductive materials, such as a carbon black or metallic elements, dispersed throughout the polymer material of the substrate (26:7-18). The polymer material forming the polymer substrate described above includes polyester (PET) (high-polymer material) (21:66-22:8, 22:18-27, 22:28-43, 22:49-50, 26:11-14). (One would appreciate that "PET" is the acronym for polyethylene terephthalate.) The impregnated substrate, highly desirable for bipolar designs, can be metallized; however, metallization of the substrate is optional (22:49-50, 22:52-53).

Munshi does not expressly teach that the electrically conductive particles include a first type and a second type of electrically conductive particle, where the first type contacts the cathode and the second type contacts the anode.

Hisamitsu teaches a bipolar, laminate type battery including at least one cell composed of a positive electrode layer, an electrolyte layer, and a negative electrode layer sandwiched by collecting layers from both sides thereof (Abstract; para. 27; Fig. 2). The collecting layers contacting the positive and negative electrode layers can be made of different material, i.e., the collecting layers may include two types of layers (para. 36, 46).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate two types of electrically conductive particles in the collector used in the bipolar electrode stack of the battery of Munshi, where the first type contacts its cathode and a second type contacts its anode, because Hisamitsu teaches that the use of differing conductive material in portions of a collector contacting opposing battery electrodes is effective in moving current from these electrodes.

Regarding claim 8, Munshi also discloses that opposite ends an electrochemical cell can have a layer of metal sprayed onto them to serve as battery terminations (electrode extracting plates) (25:46-49).

Regarding claims 10, 11 and 23, Munshi teaches that the batteries can be stacked in rectangular prismatic modules (battery module) and may be used as a cost-effective power source for an electric

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vehicle (6:33-44, 29:30-34). The remaining limitations recited in claim 10, and those recited in claim 23, have been addressed above with respect to claims 1 and 22.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Munshi and Hisamitsu et al. as applied to claims 1, 3, 6, 8, 10 and 11, and further in view of Hwang et al. (US 2005/0084760).

Munshi and Hisamitsu are applied and incorporated herein for the reasons above.

Regarding claim 7, Munshi and Hisamitsu do not expressly teach that the high-polymer material exhibits a weight average molecular weight of from about 50,000 Daltons to about 1 million Daltons.

Hwang teaches a battery that includes a current collector having a polymer film with a metal deposited on the polymer film (Abstract; para. 12). The polymer film has a rigid characteristic which keeps it from stretching during the rolling step of the battery fabrication process while still having sufficient flexibility to be rolled during the fabrication process (para. 13). The polymer may be a polyethylene terephthalate, polyimide, polytetrafluoroethylene, polyethylene naphthalene, polyvinylidene fluoride, polypropylene, polyethylene, polyester, or polysulfone (para. 13). The polymer has a molecular weight of 10,000 to 7,000,000, and preferably 50,000 to 5,000,000 (para. 13).

Since it has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art (e.g., *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)), it would have been obvious to one of ordinary skill in the art at the time of the invention to form the collector used in the battery of Munshi, as modified by Hisamitsu, using a polymer with a weight as recited by the claim because Hwang teaches that polymers with weight within that range produce a strong, but flexible, film. See MPEP 2144.05 (I).

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Munshi and Hisamitsu et al. as applied to claims 1, 3, 7, 8, 10 and 11 above, and further in view of Usui et al. (US 6,656,232).

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Munshi and Hisamitsu are applied and incorporated herein for the reasons above.

Regarding claim 9, Munshi teaches that opposite ends of its electrochemical cells have a layer of metal sprayed onto them to serve as battery terminations, as discussed above.

Munshi and Hisamitsu do not expressly teach that the sprayed metal forms a metal foil.

Usui teaches a method of manufacturing of a battery electrode (Title). The reference discusses that producing an electrode including a metal sprayed layer on one side of the electrode on which to weld the lead piece, a method of depositing metal foil in advance for reinforcement, etc., to improve the electric conductivity of a material core portion (1:41-48). It would have been obvious to one of ordinary skill in the art at the time of the invention to form the electrode extracting plate of Munshi by depositing a metal foil because Usui teaches that it is a method with which to produce an electrical contact within a battery.

11. Claims 12, 13, 16, 18, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Munshi in view of Hisamitsu et al.

Regarding claims 12, 13 and 16, the battery as taught by Munshi in view of Hisamitsu, as discussed above with respect to claims 1, 10 and 24, teaches the limitations recited in these claims, except that Munshi does not teach that the method of forming the bipolar electrode assembly includes use of an inkjet printing method or a curing step.

However, Hisamitsu teaches that the laminate type battery described above is manufactured by sequentially applying the plurality of fluids that form the components of the battery onto a substrate using an inkjet printer (para. 38, 52, 53, 54; Claims 9, 12). After the fluid is applied, a heat or optical treatment is performed for the film (the layer) formed by the fluid in order to accelerate evaporation of the solvent or solidification of the fluid (para. 39).

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Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an inkjet printing method to form the bipolar electrode assembly of Munshi, as modified by Hisamitsu, and to cure the assembly layers once formed, because Hisamitsu teaches that, since the pattern and the film thickness of each of the layers can be freely controlled, batteries having various capacities, sizes and shapes can be designed and manufactured easily (see Hisamitsu, para. 53-58); and, curing of the layers can accelerate solidification (e.g., thermal polymerization) of the fluid (see also Hisamitsu, para. 52).

Regarding claims 18, 19 and 20, the limitations recited in these claims have been addressed with respect to claims 1, 10 and 24.

Response to Arguments

12. Applicant's arguments filed November 22, 2009 have been fully considered but they are not persuasive. In sum, Applicant makes the following arguments in its remarks:

(a) "... Munshi, throughout the specification, is clearly using the acronym PET to refer to polyester, as denoted by Munshi's use of "PET(polyester)." (See col. 9, line 30; col. 19, line 7; col. 22, II. 4-5; and claim 11). Therefore, Munshi was defining in its specification that it was referring to polyester when it used PET. ..." (see p. 7-8)

(b) "... Munshi fails to teach a collector consisting essentially of the electrically conductive polymer that directly contacts both the cathode and anode as recited in claims 12 and 25, Munshi does not teach, suggest or anticipate claims 12 and 25, ...". (see p. 8-9)

(c) "Regarding claim 6 and new claim 25, the Examiner states that Munshi discloses some of the polymers listed in these claims. (Office Action, g. 3). However, these polymers are used with a metalized substrate ... Therefore, the invention of each of claims 6 and 25 is not anticipated by Munshi, ...". (see p. 9)

13. As to applicant's arguments (a) above, one of ordinary skill in the art would appreciate that a PET is "a kind of polyester material" (see "What is PET?" on www.kenplas.com/project/pet/). Thus, that artisan would readily appreciate that the Munshi reference use of "PET" refers to a polyethylene terephthalate.

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14. As to applicant's argument (b) above, it is noted that the transitional phrase "consisting essentially of" limits the scope of a claim to the specified materials or steps "and those that do not materially affect the basic and novel characteristic(s)" of the claimed invention. *In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976). Further, for the purposes of searching for and applying prior art under 35 U.S.C. 102 and 103, absent a clear indication in the specification or claims of what the basic and novel characteristics actually are, "consisting essentially of" will be construed as equivalent to "comprising." See, e.g., *PPG Industries v. Guardian Industries*, 156 F.3d 1351, 1355, 48 USPQ2d 1351, 1355 (Fed. Cir. 1998). See also MPEP 2111.03.

15. As to applicant's argument (c) above, it should be noted "[t]he use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." *In re Heck*, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also *Upsher-Smith Labs. v. Pamlab, LLC*, 412 F.3d 1319, 1323, 75 USPQ2d 1213, 1215 (Fed. Cir. 2005)(reference disclosing optional inclusion of a particular component teaches compositions that both do and do not contain that component). See MPEP 2123 (I).

Further, as discussed in a response to similar argument previously presented by applicant (see Paragraph 12 of the Office Action dated June 11, 2009), "[t]he collector of Munshi can be in direct contact with the anode and cathode in its bipolar electrode structure because one would appreciate that the metallization layers, such as layer 16a,16b included in the double-metallized structure described by Munshi (see 25:34-46; Fig. 1C), are an *optional element* in its bipolar electrode structures ... (see Munshi,

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22:49-50, 22:52-53). Thus, one of ordinary skill in the art would appreciate that the bipolar electrode structure of Munshi, with a polymer substrate *without the metallization layers*, has an anode and cathode in direct contact with at least a portion of the surface of its collector, the polymer substrate.”

16. As to the applicant’s arguments with respect to the Fukuzawa and Hinton references, the rejections using those references were withdrawn because claims 1 and 10 were amended, and claim 5 was cancelled, as noted above.

17. As to the remainder of applicant’s arguments, they have been considered but applicant has amended the claims such that new grounds of rejection were necessitated.

Conclusion

18. Applicant’s amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075**. The examiner can normally be reached on Monday to Thursday, 7 a.m. - 3 p.m. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E Enin-Okut/
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795